



UNITED STATES
DEPARTMENT OF TRANSPORTATION

Assessing Economic Benefits and Productivity Gains from GPS

Space-Based PNT Advisory Board Meeting

August 14, 2012

GPS-Based Applications are Critical to Major DOT Initiatives



Aviation – NextGen

- Reliable and accurate positioning worldwide
- Reduced delays
- More fuel-efficient routes
- Increased system capacity with enhanced safety



Rail – Positive Train Control

- Reduced probability of collisions
- Increased efficiency and capacity



Crossmodal – ITS

- Enable crash prevention among vehicles and between vehicles and infrastructure
- Increased mobility and reduced environmental impact



Maritime



Vehicle Transportation

Safety

- 32,788 highway deaths in 2010
- 6,000,000 crashes/year
- **Leading cause of death for ages 4 to 34**



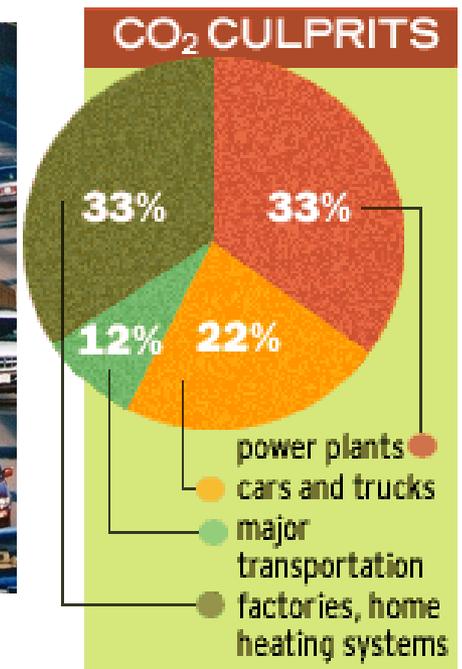
Mobility

- 4,200,000,000 hours of travel delay
- \$80,000,000,000 cost of urban congestion



Environment

- 2,900,000,000 gallons of wasted fuel



DOT Investment in GPS

- **Funding for Civil-Unique Capabilities: \$128.7M to Date**
 - **Funding Provided to GPS Directorate for L1C and Civil Signal Monitoring**
- **GPS Augmentation Systems: Approx. \$100M/ year**
- **Research and Development Activities Across DOT**
 - **In Conjunction with Major Program Initiatives**
- **Applications Rely on Investment from Commercial Industry and Consumers**



Challenges in Assessing Economic Benefits and Productivity Gains Resulting from GPS

- **Benefits Assessed at Application Level**
 - **GPS only one component of a system and often is incorporated with other technology innovations (e.g. communication systems)**
- **PNT Requirements: Accuracy, Availability, Integrity, Continuity**
 - **GPS May Not Be Only PNT Technology to Meet Requirements**
- **Don't Have a Good Baseline of Benefits Before Introduction of GPS to Measure Against**



Rail Applications

- Freight Railroads: Use of GPS to track train position and movement for operational efficiency
 - Degradation or loss of GPS could result in rail network congestion or gridlock
 - Federal Railroad Administration estimates railroads could lose productivity gains of \$15B (7% discount factor) or \$29B (3% discount factor) over 20 years
- Automated Track Inspection Program (ATIP) Vehicles: Use of GPS to record the location of track perturbations, including violations, defects and anomalies
 - ATIP has achieved a 359% increase in track inspection frequency over the last decade



Motor Carrier Applications

- 2009 Motor Carrier Efficiency Study: Characterized inefficiencies
 - \$2.7B/year Driven Empty Miles
 - \$900M/year Waiting in Ports
 - \$9.67B/year Delays in Loading and Unloading
- GPS part of the solution to address inefficiencies to support “Just In Time” shipping
- Smart Roadside Initiative and Wireless Roadside Inspection
 - Streamline roadside inspection processes
 - Potential for \$461M/year savings
- ITS Mobility Applications: Use of GPS for dynamic routing, navigation, and tracking
 - Degradation or loss of GPS could result in loss of significant transportation benefits such as decreased travel times, fuel savings, and corresponding environmental benefits



Maritime Applications – St. Lawrence Seaway

- GPS-based Automatic Identification System (AIS) reduces transit times (with accompanying lower fuel consumption) through better traffic management, and enhanced scheduling of lock passages.
- Enhances fleet management for ship owners - arrival times can be more accurately estimated, leading to more efficient scheduling of appointments with pilots and ship inspectors, thereby minimizing delays.
- Enhances navigation via the provision of timely and accurate environmental information, broadcasted through AIS channels by the Seaway's Traffic Management System



Recommendations from DOT Chief Economist

- Tie Use of GPS to Cost Reductions
 - Ensure assumptions are validated
- Incorporate Cost Reductions into a Computable General Equilibrium (CGE) Model
- Run Model to Obtain Estimates of Dynamic Economy-Wide Effects

